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Effect of prolonged second stage of labor on maternal and neonatal outcomes

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ABSTRACT

Objective: To discuss the effect of prolonged second stage of labor on maternal and neonatal outcomes. **Methods:** A total of 101 primiparas with the length of second stage of labor longer than 2 h were selected and pregnant women with the length less than 2 h served as control. The maternal and neonatal outcomes of two groups were observed and compared. **Results:** A total of 62.1%(18/11) with the length of second stage of labor between 120 min and 180 min, 46.7%(28/32) between 181 min and 240 min and 12 longer than 241 min underwent vaginal delivery. The longer the length of second stage of labor, the lower score of Apgar scale for infants in 1 min, and the higher the incidence of asphyxia. But there was no difference in scale in 5 min. As second stage of labor prolonged, the incidences of cesarean section and of postpartum hemorrhage increased. **Conclusions:** Almost half of puerperas with the length of second stage of labor longer than 2 h underwent vaginal delivery. The prolonged second stage of labor can decrease the score of Apgar scale in 1 min, increase the incidence of asphyxia, but has no effect on scale in 5 min. It still need more evidence from evidence medicine to definition of time and treatment of second stage of labor.

1. Introduction

Delivery begins from uterine contraction pain, accompanied with flattening cervical canals and dilation of cervix, and ends with the delivery of the fetus, placenta and fetal membrane. The labor usually comprises of three stages: the first stage is from in labor to complete dilation of cervix; the second stage is from the dilation to the delivery of fetus; and the third stage is from the delivery of fetus to the delivery of placenta and fetal membrane.

It is reported that prolonged labor can increase the risk of danger in mothers, including perineal laceration, postpartum hemorrhage, childbed infection[1]. Besides, it also increases the incidence of disease and cesarean section.

The result of a research, in which the clinical data from the 1st to the 5th hour were compared and analyzed, shows no significant difference in the degree of acidosis in infants at different time, and no association between acidosis and adverse outcome. Few studies reveal score of Apgar scale in 5 min less than 7 (Rate= 0.45, P=0.1)[2].

The time for entering the second stage of labor is still controversial. In this study, we selected cases with the length of second stage of labor longer than 2 h in Tunchang Hospital, Hainan Province, and analyzed the effect of prolonged second stage of labor on maternal and neonatal outcomes, retrospectively.

2. Materials and methods

A total of 101 primipara cases with the length of second longer than 2 h were selected, serving as observation group. Cases in control group were selected based on parity, the length of second stage of labor and delivery mode.

Cases with the length longer than 2 h and undergoing vaginal delivery served as Group A, cases with the length longer than 2 h and undergoing cesarean section served as Group B, cases with the length shorter than 2 h and undergoing vaginal delivery served as Group C, cases with the length shorter than 2 h and undergoing cesarean section served as Group D. Besides, cases with the length 120-180 min served as Group E, with the length 180-240 min served as

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Group F, and longer than 240 min served as Group G.

The clinical date of maternal and neonatal outcomes were observed and analyzed, including age and race of mothers, gestational week, delivery status, incidence of postpartum hemorrhage (bleeding volume more than 500 mL in vaginal delivery, and more than 1 000 mL in cesarean section) and perineal laceration, delivery mode (vaginal delivery or cesarean section), gender and weight of neonates, incidence of large for date infant (weight >4 000 g), score of Apgar scale at 1 min and 5 min, and rate of perinatal death.

All data were analyzed by SPSS software. Data were compared between groups by t-test, and asymmetric data were analyzed by χ^2 test, with $P<0.05$ as statistic significance.

3. Results

3.1. Maternal and neonatal outcomes of cases with the length longer than 2 h

A total of 46 cases underwent virginal delivery (45.5%) (Group A) and 55 cases underwent cesarean section (54.5%) (Group B). They aged from 17 to 34 years old, averaged as (23.25±3.73) years. The gestational week was from 36-43 weeks, and the length of second stage of labor was from 120-326 min, averaged as (202.19±41.05) min. Gestational week of Group A was significantly shorter than Group B ($P<0.05$). The duration of second stage of labor in Group B was significantly longer ($P<0.05$). And the bleeding volume was significantly more in Group B ($P<0.05$). There were no significant differences in age and the length of first stage of labor (Table 1).

A total of 101 neonates were delivered, with similar weight among them. And there were no significant differences in scores of Apgar scale after 1 min and 5 min (Table 2).

3.2. Maternal and neonatal outcomes of vaginal delivery cases with different length

The lengths of first stage and second stage of Group C were significantly shorter than that of Group A (t=2.10 and 27.28, respectively, and both $P<0.05$). The gestational week and bleeding volume were similar between two groups (Table 1).

The score of Apgar after 1 min was significantly lower in Group A than Group C (t=2.46, χ^2=6.95, $P<0.05$), but there were no significant differences in score after 5 min (t=1.82, $P>0.05$) and the weight of neonates (Table 2).

3.3. Maternal and neonatal outcomes of cesarean section cases with different length

Mothers in Group D were significantly older and had significantly shorter gestational week ($P<0.05$). But the bleeding volume was the same as Group B (Table 1).

The score of Apgar after 1 min was significantly lower in Group B than Group D (t=3.79, χ^2=12.88, $P<0.05$), but there were no significant differences in score after 5 min (t=1.05, χ^2=3.03, $P>0.05$) and the weight of neonates (Table 2).

Table 1

Maternal outcomes in different groups.

Group	Age (Years)	Gestational week (week)	Length of first stage of labor (h)	Length of second stage of labor (min)	Bleeding volume (mL)
Group A	23.00±3.59	39.58±1.69	9.32±7.81	187.86±34.04	165.00±34.10
Group B	23.47±3.87	40.21±1.04*	11.75±7.43	214.18±42.83	235.45±55.00*
Group C	27.59±3.97*	39.17±1.50	7.36±3.00*	44.13±26.43*	178.58±36.39
Group D	29.75±5.03*	39.38±1.14*	–	–	229.00±33.15

*: $P<0.05$.

Table 2

Neonatal outcomes in different groups.

Group	Apgar score after 1 min	Apgar score after 5 min	Weight (g)	Apgar score after 1 min (n)			Apgar score after 5 min (n)		
				0-3	4-7	8-10	0-3	4-7	8-10
Group A	9.30±1.69	9.63±1.53	3 188.01±407.04	1	5	40	1	0	45
Group B	8.89±2.14	9.78±1.35	3 338.18±385.01	1	11	43	1	0	54
Group C	9.79±0.62*	9.93±0.32	3 117.93±425.85	0*	2	90	0	0	92
Group D	9.75±0.79*	9.92±0.43	3 224.12±376.65	0*	5	109	0	2	112

*: $P<0.05$.

3.4. Different delivery mode and neonatal outcomes of cases with prolonged second stage of labor

A total of 18 cases had vaginal delivery and 11 had cesarean section from 120 min to 180 min. During 181 min to 240 min, there were 28 cases with vaginal delivery and 32 cesarean section cases; while there were 12 cesarean section cases over 241 min. Prolonged second stage of labor could increase the rate of cesarean section (χ^2=13.26, $P<0.01$). There were no significant differences in incidence of light asphyxia and the score of Apgar after 1 min and 5 min between cases with length less than 240 min and cases longer than 240 min (χ^2=4.05) and 2.09 for 1 min and 5 min, respectively, both $P>0.05$), but the difference in incidence of severe asphyxia was significant (χ^2=22.25, $P<0.01$)(Table 2).

Table 3
Different delivery mode and neonatal outcomes of cases with prolonged second stage of labor (*n*).

Group	Apgar score after 1 min			Apgar score after 5 min		
	0–3	4–7	8–10	0–3	4–7	8–10
Group E	1	1	27	1	0	28
Group F	0*	8	52	0	0	60
Group G	1*	7	4	1	0	11

*: $P<0.01$.

4. Discussion

Prolonged second stage of labor in predictor of dystocia, and will increase incidence of perineal laceration, side-cutting, infection of chorion and postpartum hemorrhage[3]. For women with vaginal delivery in our study, there was no significant difference in incidence of postpartum hemorrhage; but for women with length longer than 2 h, the bleeding volume was significant higher in cesarean section group. It indicates that not prolonged labor but the delivery mode is the single effective factor on bleeding volume.

A total of 62.1% cases had vaginal delivery from 120 min to180 min (18/29), 46.7% from 180 min to 240 min (28/60), and no case over 241 min in this study. While it is also reported that 68.5% cases had vaginal delivery from 240 min to 360 min, 60.0% from 360 min to 480 min (28/60), and 50% over 480 min[3].

The incidence of cesarean section with arrested labor as indicator is 68%. It may attribute to the strict management of labor in China. According to ACOG standard, at least 16% of pregnant women have cesarean section due to arrested labor, and 36% with diameter of uterus cervix longer than 10 cm have normal second stage of labor[4]. It put forward some questions about the diagnosis of prolonged second stage, such as how long the length of prolonged second stage should be, whether it is pathological or physiological, etc. It is still need further study.

What people concern most is the prognosis of neonates. However, very few researches provide the relationship between the length and neonates' mobility and mortality. The retrospective analysis of cases with natural delivery focused on clinical data of 25 069 cases with single birth and cephalic presentation birth in Northeast Thames[1] and 150 759 cases with single birth in California University[2]. The outcomes of neonates with length of second stage of labor from 1 h to 6 h were similar whenever they were delivered. Our study also showed similar results of Apgar scale after 1 min and 5 min in four groups. Delivery mode had no effect on neonatal outcomes, and there was no significant difference in results of Apgar scale after 1 min and 5 min between Group A and Group B.

The length of second stage of labor is generally defined as 30 min for multiparas, and 60 min for primiparas. It is regarded as prolonged second stage of labor when the length is longer than 1 h for multiparas and longer than 2 h for primiparas[5]. It usually takes about 1 h for fetus head to descend toward perineal region. This period is passive, and is dependent on uterine contraction. While the active period also takes about 1 h, and is dependent on pregnant women's exertion. So the prolonged length is about 2 h for multiparas, and 3 h for primiparas[6].

Some researchers put forward that the first phase of second stage of labor should be covered by first stage of labor[7-10]. This phase has no effect on mothers, but is effective on perineal during active period[8]. It is reported that if second stage of labor and maternal and neonatal conditions are satisfactory, limit on length of labor is unnecessary[12].

It has been proved that some factors can cause adverse outcomes of neonates. Acceleration of second stage of labor due to overlong and difficult labor will result in slow beating of fetus heart and secondary anoxia[13]. This acceleration can also cause increased pH of cord blood[11]. At dorsal position for long time, pregnant women have uterus press abdominal aorta, which brings to lack in blood supply for placenta uterina, and to anoxia of fetus[14]. It is reported the level of hematic acid of neonates delivered via dorsal position is higher than that of neonates delivered via hypotension syndrome due to semi-sitting position[15].

Conflict of interest statement

We declare that we have no conflict of interest.

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